THE ENDOCRINES AND THE VEGETATIVE NERVOUS SYSTEM *

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While it is commonly accepted, even by the most conservative, that the endocrine system and the vegetative nervous system are closely correlated embryologically, physiologically and clinically, yet the actual contacts are not always simple to prove. Furthermore it is most difficult to establish whether internal secretory products can produce their effects without the necessary presence of the vegetative fibres by direct mediation through the blood stream or not, and whether vegetative fibres can produce their effect without glandular collaboration. In some cases, such as the necessary presence of normal splanchnics for the adequate adrenal effects—as shown by Cannon—the matter is quite clear, but in the thyroid or pituitary domain much confusion exists. In the case of the thyroid for instance it had always been thought that the vegetative fibres from the cervical sympathetic were in direct contact with the acini of the gland. Now, Nonidez confronts us with evidence that these thyroid cells are absolutely free from direct vegetative fibres—these latter passing exclusively to the blood vessels of the thyroid. The effects therefore obtained by Cannon and his co-workers by connecting the central end of the phrenic nerve with the peripheral end of the cervical sympathetic and obtaining by this means methodical and regular impulses passing through the phrenic via the sympathetic to the thyroid—a hyperthyroid effect with all its concomitants even to a unilateral exophthalmos—seem to have been produced through the intermediary of an enlarged blood supply to the vessels of the thyroid and not to its secreting cells—if Nonidez is right.

But other papers of these sessions will take up the morphology, physiology and pharmacology of the vegetative nervous system and the internal glandular connec-

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tions, and therefore I will limit myself only to the one cited instance of the difficulty in getting at the actual facts of the relationship between the two systems. My function is to present to you in as concise a manner as possible what appear to the clinician as effects of a disturbed vegetative nervous system in relation to the internal glandular system, as these perturbations affect the individual. That many errors of deduction will enter such an exposition of course goes without saying, but perhaps enough material may be shown to illustrate disturbances which at least apparently belong to this group of reciprocal activities.

Because of the similarity of embryological development between the cells of the sympathetic system and the chromaffin cells of the adrenal glands, it is meet that we begin our discussion with the adrenals. Cannon showed that adrenalin stimulates the sympathetic system, and that stimulation in turn produces the various effects of such sympathetic activity, *viz.*, the coagulation time of the blood is diminished, blood pressure is heightened, blood sugar is mobilized in the blood stream, there is produced a change in the distribution of the blood mass, so that it is found mostly in the muscles and in the nervous system and is much diminished in the abdominal organs causing a cessation of activity there. All these facts tend to conserve the individual in his emergency, *i.e.*, produce most quickly at the necessary points much blood, rapidly coagulable when shed, and containing that great necessity for muscular activity—blood sugar. Active muscle, be it known, consumes three and a half times as much sugar as resting muscle. At the same time the entire nervous system is alert to direct fight or flight as may be. This fight may be one against other individuals similarly equipped or it may be against other forms of aggression such as germ assault, toxins, acute infections and shock. All such combats require relatively more adrenalin to withstand their assaults and the blood shows an increase of this secretion at these times. Crile proved that injections of colon bacilli, for instance, increased the normal adrenal supply of the blood. Frequently these noxious

agents are so devastating that the adrenal glands are exhausted of their supply and syncope results, with all the phenomena of shock. In emotional excitement, likewise, the sympathetics are involved, liberating through adrenalin, blood sugar. If such excitement is followed by muscular activity, this sugar is consumed, but if not, then frequently it passes out through the kidneys and glycosuria—transient—results. As one author graphically described it, when stocks in Wall Street go down, diabetes goes up! Applied to human individuals, what can we say of the symptoms and physical signs that are produced by reason of a disturbance of the adrenals and the correlated vegetative system? There is a large group of individuals that shows in certain specific examinations many stigmata due to such a mutual disturbance. This group is characterized by small and inadequate adrenals (proved by post-mortem examination in those that succumb) and with this deficiency, hand in hand, we see many of the following signs: (1) small cardiovascular systems; (2) low blood pressures; (3) low blood sugar; (4) long coagulation time of the blood; (5) changes in the composition of the blood, largely, a deficiency of polymorphonuclear leucocytes and an increase in the lymphocytes; (6) deficiency in other tissues such as the pituitary gland which is usually small and frequently largely enclosed; (7) small and undeveloped genitals in both males and females; and many other inadequacies in the tissues of the body. It is the group now designated by the term "status hypoplasticus." The fact that many of these cases show large and persistent thymus glands, large tonsils, Peyer's patches, enlarged spleen and a general hyperplasia of lymphoid tissue led to their original designation as "status thymicolymphaticus." The former, more recent name is perhaps better adapted. By virtue of the deficiencies enumerated, certain symptoms present themselves which make of the victims of this condition inadequate personalities short of actual disease. These symptoms are largely produced because of the lack of the proper stimulation in time of need, of the vegetative nervous system by the inadequate

adrenals. So that "fatigue" after but little exercise whether of mind or of body is pronounced; recovery from fatigue is lengthened because of the difficulty in raising the blood sugar content; the lowered blood pressure likewise inhibits normal activity; the small pituitary and genitals lead to disturbances specific to themselves. As a result of these, added to many minor difficulties in the train of the trouble, the individuals affected feel themselves different from their more fortunate fellows and inferior to them. And so they become rather shy and shut-in, do not mix readily, feel that they cannot meet their daily problems successfully and so try not to meet them at all; are easily led by stronger minds and bodies and become more or less dependent on them. So are produced many habitues of alcohol and drugs, many of the easily led characters among the criminal classes; a large number of psychoneurotics belong to the group and their symptomatology depends largely upon the poor quality of the tissues of the body supplied by the vegetative nervous system under the sway of the adrenals; so that they have cardio-neuroses; gastric neuroses; genital and sexual disturbances; and added thereto, the mental perturbation that accompanies such states. The sympathetic division of the vegetative nervous system is the one that is at fault, for it depends on adrenalin for its emergency activities. Perhaps the parasympathetic therefore, according to the Eppinger and Hess theories, is the one that dominates the picture of deficient adrenal supply and hence the multitudinous symptoms that occur under the designation "vagotonia" more or less fit into the picture. What we have said of the adrenals is presumed to relate to the secretion of the adrenal medulla, although in recent years the cortex, to a large extent, has come into its own. From our small knowledge of the actual active principle or principles involved in suprarenal cortical activity, we cannot at present entirely separate its influence from that exerted by the entire gland. The diminution and gradual atrophy of the suprarenals, probably the cortex as well as the medulla is responsible for the gradual bodily deterioration

and disintegration known as Addison's Disease, with its lowered blood pressure, lowered blood sugar, pigmented areas, rapidly diminishing resistance to fatigue and exertion, gastro-intestinal disturbances and all the diminution in tone of smooth muscle incidental to loss of sympathetic nervous control.

(Here are shown lantern slides of individuals belonging to the group with a history of their difficulties.)

In the domain of the thyroid gland, there is seemingly as little difficulty in associating its disturbances with reciprocal activities of the vegetative nervous system, as is the case with the adrenals. However, if it is true that the cells of the thyroid secreting acini are not anywhere in direct contact with the postganglionic fibres of the sympathetic, as Nonidez has apparently shown, then the matter lies a little differently. The vegetative system can then influence thyroid activity only through the intermediary of the blood vessel control. The thyroid secretion, however, apparently has a direct influence upon the cells or upon the synaptic junctions of the vegetative—probably largely sympathetic—nervous system, lowering their threshold of stimulation. However this may be there is certainly mutual activity—so much so indeed, that once the thyroid is sufficiently aroused, the sympathetics are secondarily stimulated and in their turn via the cervical sympathetic, the thyroid vessels are brought into play and the thyroid secretion increased thereby. This produces a real vicious circle leading gradually to thyroid exhaustion (unless means are taken to break it) and ending in actual myxoedema.

The effect of thyroid activity on the vegetative nervous system is again somewhat in doubt. While there is no doubt whatever that the thyroid secretion is stimulative to the sympathetic division resulting in increased metabolic exchanges, *i.e.,* is katabolic, there is also reason to believe that it has anabolic effects as well. Occasionally one meets with a patient who shows preponderating vagus

effects with thyroid medication rather than sympathetic —but this is against the rule.

The results of excessive thyroid secretion on the organs are manifold. Among the chief ones of course are an increase of all bodily functions, especially those under the sway of the sympathetic. As a result, increased oxidation results with increase in pulse rate, blood pressure, blood sugar, body temperature and a generally increased speed of activity everywhere. This is seen particularly well in the brain and nervous system generally. The patient is speeded up in all nervous reactions, thought is more rapid, action follows judgment more quickly there is never an idle moment. In early life, in all forms, development is quicker, maturity reached earlier. Thus Gundernatsch caused tadpoles to develop into frogs within three weeks on thyroid feeding, whereas the normal metamorphose takes place in ten to twelve weeks. Many of these results seemingly depend partly upon the thyroid effect on the vegetative nervous system. The symptoms arising from its vagus effects (parasympathetic) are increased peristalsis, increased perspiration and generally an increase in the gastric juice which is of greater than usual acidity. A deficiency of thyroid secretion produces the converse effects: slowing of pulse rate, lowering of temperature, lowered blood sugar and a diminished activity in mental and nervous reactions. Ratiocination becomes sluggish, motion slows down, fatigability and drowsiness are the rule. Initiative is lost. If this occurs in early life then development is retarded. This is true in the mental sphere as well as in the physical. The personality differences between the hyperthyroid and the hypothyroid individuals is at times so great that they are constantly incompatible —one too slow for the other's gait, the other too fiery for the former's lethargy. Many a human combination has been destroyed by this factional difference.

(Here slides are shown illustrative of some of the conditions cited.)

One of my patients showed very interesting thyroid effects with sympathetic concomitants at the slightest emotional stimulation. Whenever in the course of examination she related occurrences that had aggravated her, she would flush, her pulse rate increased rapidly, her thyroid gland visibly enlarged and exophthalmos was produced—all within the space of five minutes. Urine collected shortly afterward frequently showed sugar. Her customary basal metabolic rates were well within normal limits. Many similar cases might be cited.

The third glandular unit in this triple mechanism concerned largely, together with the vegetative system, with the maintenance of normal levels in the organism—or as Cannon terms it *"homeostasis"*—is the pituitary gland. Its importance may be gleaned from its excellently protected position in a skull within a skull. Normally, most investigators are agreed that as a whole it is concerned with several functions in collaboration with the vegetative nervous system. These are the control of growth, regulation of water interchange, stimulation of smooth muscle fibre particularly of the uterus and of the intestine, maintenance of blood pressure and of the sugar content of the blood, and according to some authors, exerting a control of the circulation of the cerebrospinal fluid. The various portions of the gland that specifically exert these influences are the anterior lobe for growth and fat metabolism as well as for sexual stimulation; the posterior for the pressor and oxytocic effects and water and sugar metabolism. It has for its coadjutor in some of these effects the pars intermedia. The matter of water control has recently assumed some importance because of the fact that the French investigators Roussy and Camus had apparently determined that injury to the base of the brain just posterior to the pituitary was specifically the cause of diabetes insipidus, and that theories that were based upon posterior lobe pituitary disturbance as a causal factor did not take cognizance of neighborhood effects, particularly in the region of the corpora mammillaria as the efficient cause. Also that because posterior lobe ex-

tracts—administered hypodermatically—seemed to be specific in their control of the diabetes it did not necessarily follow that injury to the posterior lobe was necessarily the cause. The theory of Roussy and Camus has held more or less sway for the past decade; but quite recently from the Department of Pathology of Chicago University came a case that mathematically demonstrated the fact that the posterior lobe injury alone, apart from any other lesion, can produce diabetes insipidus. This was a syphilitic gumma that had invaded the *posterior lobe of the pituitary only.* Serial sections of the base posterior to the hypophysis and including the corpora mammillaria showed absolute normality there. The patient's symptoms had been particularly headache of the pituitary character and diabetes insipidus. The fact is probably that there are many links in the chain controlling water exchange in the body of which the corpora mammillaria region is only one. The rationale of the diuresis has been variously explained. Possibly the correct one is that while the posterior lobe extract causes arterial tension in most of the tissues of the body, yet the arterioles of the kidney are dilated by it determining a greater supply of blood to these emunctories. This effect is probably through the vegetative fibres. Pituitary effects according to Cushing and Weed may be produced by stimulation of the fibres of the sympathetic coming from the first three thoracic nerves. These pass via the cervical sympathetic to the carotid plexus and thence to the pituitary. One of the chief effects of such stimulation is the passing of large amounts of urine of low specific gravity. Before the use of pituitrin for diabetes insipidus was common, codeine and similar drugs were used for this purpose. Their effect was probably on the sympathetic, diminishing its effect on the pituitary gland. At this point a seeming paradox may be mentioned, namely, that while stimulation of the posterior lobe produces a diabetes, injections of pituitrin control it! One meets with such paradoxes in medicine occasionally—perhaps too often in the field of endocrine medicine.

The anterior lobe has recently also been given the at-

tribute of increasing the metabolic rate. One case might be cited that contains again a paradox unless explained on this basis. The patient, a woman of forty-five years of age, was sent to the hospital complaining of headache, visual disturbances, great increase of weight, mental hebetude and great depression. Upon examination, the visual fields were proven defective in both temporal halves, she showed a mild papilloedema, her basal metabolic rate was about plus ten (determined in many laboratories) and her pituitary fossa on x-ray examination was found much enlarged, particularly anteriorly, and eroded. Of course an immediate diagnosis of pituitary neoplasm was made. Upon closer examination, however, the patient appeared to look myxoedematous rather than obese, and having come from a goitre region it was then thought possible that part of her difficulty was thyroid in character. Small doses of thyroid were given to her and the change in the entire picture was remarkable. The headaches disappeared, the visual fields became much larger, the papilloedema receded, the myxoedematous appearance disappeared and the strangest one of all the phenomena, the basal metabolic rate diminished to a point somewhat below normal! That is to say, against all rule, thyroid administration apparently diminished basal metabolism. Theoretically it seems probable that because of deficient thyroid activity the pituitary, particularly the anterior lobe, compensated for this deficiency and by enlarging for this purpose brought on the entire pituitary picture and increased the basal metabolic rate to plus ten in spite of thyroid deficiency. When thyroid was finally exhibited, contrary to laboratory indication, the necessity for compensation disappeared, the pituitary resumed its original normal condition, the symptoms thereof vanished and the woman was restored to health. She is quite well to-day with none of the pituitary symptoms or signs remaining excepting the enlarged pituitary fossa, some ten years after the original onset of her trouble. The anterior lobe probably affected the vegetative system as does the thyroid, to increase metabolism. She must constantly, however, take both thyroid

and small amounts of iodine to keep her well. It seems to me that this one case illustrates very well the interrelationship of both thyroid and pituitary anterior lobe with the vegetative nervous system—particularly the sympathetic division, and the autonomic self-regulatory and compensatory possibilities entailed in these mechanisms.

Another important case in this interrelationship between the pituitary, the adrenals and the sympathetic system is the following: A man of some thirty years of age came to the hospital with a pronounced acromegaly—a classical case, as the screen picture shows. His pituitary fossa as you see is enormously enlarged; he did not show a bitemporal hemianopsia, but he had pronounced pituitary headaches and complained, curiously enough, of intense fatigability and general muscular weakness. Delving into his past history, we obtained the knowledge that at about eighteen years of age he had an obscure abdominal condition with diarrhoea, temperature and marked asthenia. There was a history of tuberculosis in the family and his case was denominated at the time, intestinal tuberculosis. Immediately following this, there began to appear on symmetrical areas of his body, pigmented areas, chiefly spinal root areas of the two upper dorsal levels. And within a year, his acromegaly began while a comparative freedom from his weariness and asthenia and abdominal symptoms gradually occurred. This made him moderately comfortable until a few years ago, when his headaches became unbearable and he sought relief. An analysis of his case would, I believe, place it in the category of an original tuberculosis of the adrenals with loss of sympathetic effects, with the asthenia, abdominal symptoms and pigmentations that accompany such a disturbance, gradually improving by virtue of some mechanism which might offset the adrenal symptoms. Such a mechanism is present in the posterior lobe of the pituitary gland—which mobilizes sugar, maintains blood pressure and acts as a stimulant to smooth muscle fibre—but at the cost of a compensatory enlargement. Such enlargement will then, in its turn not

only produce the necessary alleviation of the adrenal symptoms but also in addition its own specific symptoms —acromegaly, enlargement of the pituitary fossa and so on. After having reached a certain level in the acromegalic process, this remained without increase and this patient's treatment with pituitary extract, both by mouth and hypodermatically, helped him extremely.

The cases that show a small and usually markedly enclosed pituitary fossa with many of the evidences of pituitary glandular deficiency, exhibit at the same time many vagotonic or parasympathetic symptoms; low blood pressures, slow pulse, lack of initiative and tendency to drowsiness; and on the psychic level, difficulty in concentration and sustained thinking and a character of rather shut-in type, mark the vegetative disturbances in their combination with functions of the cerebrum. (The screen illustrations mark some of these cases.)

One final glandular unit with whose effects I have had some personal experience, is the parathyroid gland. For many years, ever since the work of McCallum and Voegtlein on calcium metabolism, much has been done in an experimental way with the parathyroids, and yet, only a very few years ago, the *Journal of the American Medical Association* published an account in which the parathyroids were relegated to the far background in their effects, so far as we knew them, on the human organism. We did know that in the old complete thyroidectomies the parathyroids were also removed and tetany universally resulted. In all experimental animals this took place except in some of the *ungulata*. It was supposed that this was because they did not eat meat. But more acute observers, investigating the matter, found that in these *ungulata* the parathyroids were not imbedded in thyroid tissue. but were separately placed. Thyroidectomy did not remove them and hence our first glimpse into their effect on bodily economy was vouchsafed. They had a function which prevented tetanic contractions. Later McCallum and Voegtlein gave us the picture of the rela-

tionship of calcium to muscular sensitiveness and irritability, and of its mobilization to the activity of the parathyroid glands. Since then, Chiari and Froehlich have also demonstrated the hyper-irritability of the entire nervous system in calcium deficiency. Since that time we clinicians have been endeavoring to apply this knowledge to our work. In the past decade we have examined many cases that showed deficiency in blood calcium. The larger number never exhibited entire tetany or other muscular spasmodic phenomena. But they did show other symptoms of a most interesting character. They usually came because of inordinate fatigability, irritability of temper and at times even of incorrigibility, non-amenability to discipline, and assaultiveness; they were easily aroused to a high pitch of anger at the slightest provocation—a word, an insinuation or even a glance being sufficient to arouse intense antagonistic reaction. These patients became problem cases at home, at school or in whatever environment they found themselves, because of their non-adaptability and uncompromising attitude. Occasionally their behavior became so exaggerated that apparently hypomanic states developed therefrom, and several of these patients had to be confined in institutions until the symptoms were ameliorated. At home, a harsh word from any member of the family, at the table for instance, would result in a plate or knife or some other utensil being thrown at the aggressor. In school, a blow, a shout or a curse would be hurled at a fellow student, or even at the teacher. Because these patients seemed to me to have many points in common, such as stature, bodily features and biochemical conditions, it seemed important to determine whether they formed an actual group which could be differentiated by certain stigmas, in both the physical and the biochemical domains. I have collected the reports of a representative group of such cases and have arranged and classified the observations to bring out some of the common correlated features.

Practically all the cases, in both children and adults, showed the physical signs of myotatic irritability and

myoidema, some to a greater degree than others. In some, the myotatic irritability would be increased to such a point that a Chvostek reaction of moderate degree was obtained. The unanimity with which myotatic irritability was found in this entire group of cases is striking. The converse, however, that all patients with myotatic irritability and myoidema have the behavioristic qualities shown by patients in this group is not true to the same extent, but the attributes are nevertheless sufficiently prevalent to awaken suspicions of conduct disorders whenever these physical signs are evoked. The best site for eliciting both myotatic irritability and myoidema is at the shoulder over the deltoid and pectoral muscles.

Because of the correlation between muscle irritability and non-utilization of calcium, I next undertook the examination of the calcium content of the blood. In our laboratory examination, the calcium content of the whole blood is determined—not merely that of the serum. The normal values are from 6.5 to 9.5 mg. per hundred cubic centimetres of whole blood. From the tables it will be seen that nineteen of twenty-three cases showed deficient blood calcium, varying from 5 to 8 mg. per hundred cubic centimetres. The four cases that showed an apparently normal blood calcium are of interest for the reason that treatment was just as efficient in them as in the other nineteen cases that showed deficient blood calcium. This led me to suppose that it was not so much the presence of calcium in the blood that determines the disturbances as it was the *utilization* of calcium which under treatment seemed generally to be increased. It is curious to note that in many of the cases in which a low calcium content was observed in the blood, there was an increased deposit of calcium in various portions of the body producing thick skull tables, and particularly that there were calcium deposits in the pineal gland.

It is interesting to note that of nineteen cases in which the skull was examined with the X-ray, fourteen showed a pineal shadow in spite of the fact that the patients in all

were sixteen years of age or less—a comparatively rare observation. Whether the pineal calcification is merely a part of the calcium metabolic disturbance in the patient or whether it represents a pineal involutional process is difficult to say. If it represents a pineal involutional process, one would expect to find some structural or metabolic effect. As a matter of fact, in five of my cases in which a pineal shadow was shown, there were such symptoms as enlarged clitoris and breasts (one case) pubertas praecox (one case) and enlarged genitals in boys (three cases). In several others, psychosexual precocity was pronounced. Whether or not the pineal effect on muscular activity, as has been said, is a fact, it is interesting to note that a large percentage of my cases showed intense muscular fatigability in spite of an increased blood sugar and increased blood pressure.

The next interesting observation in these cases pertains to growth in length. Of nineteen cases, six of the children were of normal height, four were between 2 and 4 inches (5.08 and 10.16 cm.) below average height for age, and nine were 4 inches (10.16 cm.) or more below the average height for age; these figures show a tendency toward dwarfism. When one realizes that the utilization of calcium is deficient, one can readily understand how part of non-utilization might readily have affected the growth of the long bones.

Running in inverse proportion to the calcium is the sugar content of the blood. Only two of my patients had a sugar content below 100 mg. per cubic centimetre; the blood sugar of twelve being between 110 and 140 and this occurred in subjects under sixteen years of age. A low calcium content in combination with a high content of sugar in the blood has been noted by some observers in some types of diabetes, although in none of my patients was glycosuria present.

Although the patients whose cases are here used as illustrations were sixteen years of age or under, fourteen of seventeen had a blood pressure above 100, ten above 110

and five about 120; one girl, eleven years of age, had a systolic pressure of 140. The high content of sugar in the blood and the high blood pressures are possibly secondary to sympathetic disturbance, involving perhaps also the suprarenal or the pituitary glands. Indeed, with the rather high sugar mobilization, both suprarenal and pituitary glands in relation to the sympathetic might well be considered in connection with the comparatively high tension.

All of the cases were classified on the one basis of behavioristic qualities. As already stated, these varied from the simply incorrigible and quarrelsome ones to those performing assaultiveness and exhibiting the most violent temper, reaching the point of hypomanic disturbance. Whether these behavioristic qualities are due to defect in the utilization of calcium or to some other factors that have been discussed, is a moot point. It seems to me, however, not only because the low utilization of calcium is the most constant factor, but also because of the effect of non-utilization of calcium on the muscular system, that the behavioristic anomalies may belong to the same category, depending on the non-utilization of calcium by the vegetative nervous system. It has been shown by a number of previous investigators that diminution in the supply of calcium to the blood results in increased reaction of nerve tissue to an induction current. It is possible that the same factors that bring about myotatic irritability in the muscle, also bring about untoward reactions in the nervous system. That is to say, reaction follows stimulus so rapidly that the overt act is committed before reason and judgment can come into play for purposes of inhibition.

This speed of nerve reaction is perhaps also the basis for the wit and precocity shown by these persons—a property which they all possess.

For the most part, not only are these patients remarkably witty and precocious in replies and reactions, but they are, in the main, intelligent as well. Theirs is not the

incorrigibility and bad-temperedness of the moron and the defective, for on psychometric test in all of my cases only one subject showed an intelligence below normal. Indeed, in school these children were among the brightest and highest in scholastic standing.

The high blood sugar values, the assaultiveness, the speed of reaction time, the high blood pressures, all point to a sympathetic activity above the normal. That is to say, absence or rather diminution of parathyroid activity is consonant with increased sympathetic tone; normal parathyroid secretion corrects this and is therefore probably among the vagotonic group or parasympathetic stimulants. This curious juxtaposition of thyroid and parthyroid anatomically, with reverse effects on the vegetative nervous system is frequently met with in the glandular system—witness the cortex and medulla of the suprarenals and the anterior and posterior lobes of the pituitary.

With these examples presented to you of the intricate correlations between some of the glandular elements and the division of the vegetative nervous system and the disease pictures produced by their disturbances, I trust that my function this evening has been of sufficient interest to you to stimulate further research and inquiry into the past histories of those of your patients whose complaints have only partially been understood and evaluated, with the purpose of determining a kinetic rather than a static viewpoint of the causation of many human ills.